Headquarters U.S. Air Force

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Air Force Technology Readiness Assessment (TRA) Process for Major Defense Acquisition Programs

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Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
SEP 2007		**00-00-2007 to 00-00-2007**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Air Force Technology Readiness Assessment (TRA) Process for Major Defense Acquisition Programs	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **SAF/AQRE,Pentagon,Washington,DC,20301**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES
See also ADM002182. Presented at the AFRL Technology Maturity Conference held in Virginia Beach, VA on 11-13 September 2007.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**17**	

Purpose

Provide Air Force perspective on MDAP Technology Readiness Assessments

Outline

- What is a TRA?
- Statutory/Regulatory Requirement
- Why do a TRA?
- AF TRA Process
- What We've Learned

What is a TRA?
(DoD TRA Deskbook, May 2005)

- **A TRA is an *objective*, systematic, metrics-based *process* and *report* that *assesses the maturity of Critical Technology Elements (CTEs)***
- **Not a risk assessment; not a design review**
- **Regulatory requirement for *all* acquisition programs; statutory for MDAPs**

Technology Maturity Requirements

- **Statutory – USC Title 10 Section 2366a requires Milestone Decision Authority (MDA) Certification *prior to MS/KDP B* approval for Major Defense Acquisition Programs (MDAPs)**
  - **"*the technology in the program has been demonstrated in a relevant environment*"**
  - **Equates to Technology Readiness Level (TRL) 6**
- **Regulatory – TRAs required for *all programs***
  - **DoDI 5000.2: Required at Milestones (MS) B & C**
  - **NSS Acquisition Policy 03-01: Required at Key Decision Points (KDP) A, B, & C**

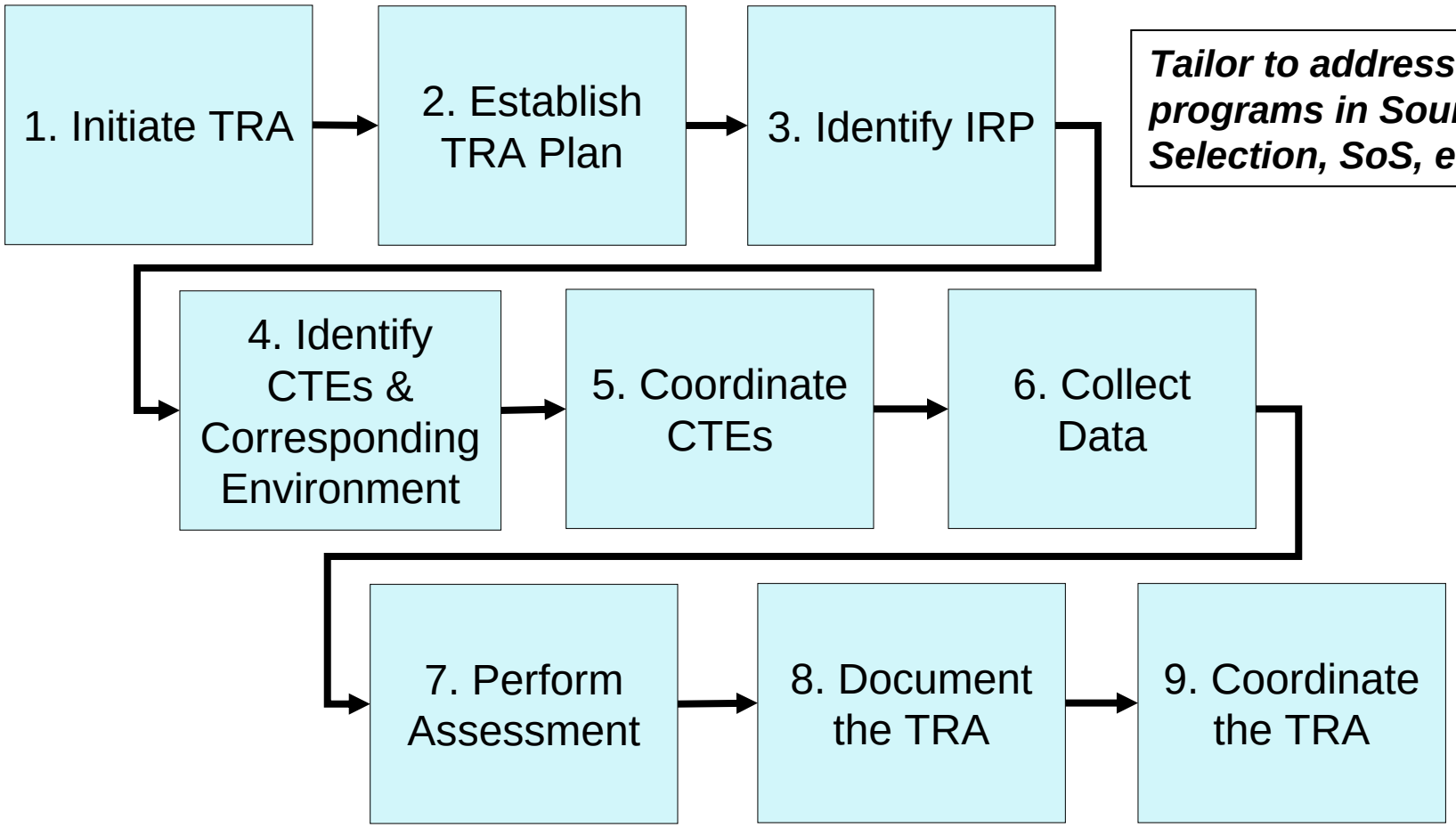
JROC Technology Maturity Requirement

- **JROC Memo (261-06, Dec 06) – Capability Development Document (CDD) and Capability Production Document (CPD) require discussion of critical technology elements (CTE), CTE linkage to Key Performance Parameters (KPP), and information on the Technology Readiness Assessment**
  - **Purpose: "to review a program's essential performance elements in the context of cost, schedule and technical risks"**

Why do a TRA?

- GAO assessments have correlated low technology maturity with program problems
  - Programs that began development with immature technologies averaged
    - 32% cost growth
    - 20 months schedule growth
- Help acquisition programs be timely, on cost, meeting the user requirements
  - Help acquisition programs better understand their technology status & technical planning
  - Provide senior leaders with current, accurate technical information to make better decisions

AF TRA Process



CTE – Critical Technology Element
IRP – Independent Review Panel
TRA – Technology Readiness Assessment

AF TRA Process Variations

- **Follows guidance in DoD TRA Deskbook, May 2005**
  - Tailored for each MDAP in compliance with DoD and National Space Security policy and guidance
  - Three touch points to ensure objective TRA
  - Independent of the program office
- **CTEs assessed by an Independent Review Panel (IRP) with two basic variations**
  1. Program office builds initial TRA and briefs IRP on proposed CTEs and artifacts on CTE maturity at formal IRP meetings
  2. IRP conducts entire TRA (with program office support)
- **Other variations**
  - Component S&T Executive provides the results of the IRP to the Independent Program Assessment (IPA) Team for space systems per NSS Acquisition Policy 03-01
  - Technology readiness must be addressed during source selections conducted in conjunction with Milestone B (or KDP B)

What We've Learned
The Process

- TRA is a process, not a "just in time" milestone document
  - Start early, integrate with overall technical and acquisition planning
  - Title 10 MDA certification requirement raises the bar on TRAs
- Need to dive deeper than the component level to identify the technology
  - A thorough & disciplined technical scrub of the program is needed identify all technologies (from which CTEs are determined)

What We've Learned

IRP Membership

- **IRP membership needs**
  - **1) Domain experienced experts who understand the context of the technology environment & use,**
  - **2) who can connect the dots and ask good questions in a peer review setting, and**
  - **3) are independent of the program office and the technologies being developed (sister service participation adds bonus points…)**

What We've Learned

The Power of Change

- **Programs will change their approach if the TRA shows maturity levels lower than expected**
  - **However, they need this information early enough to make changes…**

What We've Learned
Technology vs. Design

- There is a misconception between the technology and design implementation
  - TRL scale blurs pure technology with program design implementation as maturity increases
    - Can just a technology be proven mature (TRL 7, 8, 9) without system integration?
  - When does design or technology change cross the line to become a Critical Technology Element?

What We've Learned
Education

- Education of people new to the process needs to start early
  - Most people have never been hands-on with a TRA leading to misconceptions
  - Better understanding of the TRA process and methodology leads to efficient work
  - Recognize that the broader workforce is still climbing the learning curve

What We've Learned
What it is and is not

- TRLs are becoming very popular, but remember
  - TRLs are only a current snapshot in time – not an indicator of future success
  - the TRA is only an input to program risk
  - the learning curve can be very steep for those not familiar – education can make or break a good assessment
- Great tool for systems engineers, but most not familiar

What We've Learned

What needs attention

- Methodology lacking in some areas
  - TRLs at the Systems-of-Systems (SoS) level
  - Defining environments for Space Systems
  - Technology vs Design (e.g., new or novel)

- Integrating technology maturity demonstrations into T&E planning
  - Demonstrations are not always part of programs' "integrated" V&V process, which is based on requirements verification

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